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RUBUS IDAEUS AND ITS VARIETY ANOMALUS IN AMERICA.

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(Plate 20.)

EARLY in June a very remarkable *Rubus* was found by Mr. W. W. Eggleston in the crevices of limestone ledges at Cavendish, Vermont. The shrub, which is distinctly of the raspberry type, is characterized by its small roundish simple or rarely trifoliolate leaves, and at Cavendish it is associated on the ledges with another very local plant, *Arenaria macrophylla*, Hook. A careful study of the American raspberries shows Mr. Eggleston's plant to be referable to none of our described forms, but it is found, on the other hand, to be essentially identical with a very rare and much discussed *Rubus* of northern Europe, *R. idaeus*, L., var. *anomalus*, Arrhenius (*R. Leesii*, Babington).

This round-leaved raspberry is known in Europe from only a few limited stations in Scandinavia, Great Britain, Germany and Holland. Its discovery among the Green Mountains, then, is interesting as adding still another plant of northern Europe to our apparently indigenous flora. But its occurrence in America is noteworthy not merely from its geographic interest. The discovery of the plant at new stations in Europe has generally been the signal for a fresh discussion of its relationships, and these discussions have shown the variety *anomalus* to be phylogenetically one of the most significant members of the genus.

For several years the botanical journals of northern Europe contained extended articles and notes upon this *Rubus*, many of them offering suggestions as to the origin of the plant. In the English Botany, Boswell Syme suggests that "it may be a hybrid form, but

I [he] cannot think it probable that the species [*R. Leesii*] is a variety of *R. idaeus*."¹ The theory that the plant is a hybrid was further maintained by William Culverwell, a distinguished authority on hybridization as well as upon the genus *Rubus*. Mr. Culverwell published a figure of a plant, perhaps identical with the round-leaved *R. Leesii*, which he states was produced by crossing the strawberry and raspberry.² One of the main points in the argument for the hybrid origin of the plant was found in the general sterility of its drupes, a condition which, as we shall see, is otherwise satisfactorily explained by Dr. Focke of Bremen.

Among the numerous discussions of the round-leaved raspberry, one in particular is of interest to us. In 1873, Professor Areschoug published a paper entitled, "On *Rubus idaeus*, L.; Its Affinities and Origin."³ In brief, Professor Areschoug's argument was as follows: In Europe *Rubus idaeus* is a unique species, the other fruticose *Rubi* of Europe belonging to the blackberry type, and presenting such a variety of intergrading forms that their specific limitations are very obscure. *Rubus idaeus*, however, differs from all these species in having red or amber berries which separate readily from the receptacle, in having thin bark which scales off from the old canes, and in producing from the root buds which develop into canes. These and many minor points distinguish *Rubus idaeus* from the other European species. Yet this isolated European raspberry varies excessively, a tendency characteristic of genera with many closely related species, but not ordinarily seen in plants isolated from other species of the genus or subgenus. Ordinarily, then, species which have a strong tendency to vary are more or less completely connected with each other—for instance, our American blackberries, or asters. "But *R. idaeus*, L., though greatly variable, produces no intermediate forms connecting it with the other European species, and this circumstance seems to me [Areschoug] to be of such importance that I consider it as belonging to another type."

From the study of material from different regions, Areschoug came to the conclusion that it is "very likely that *R. idaeus*, L., as well as the North American forms most closely related to it, have

¹ Syme, Eng. Bot. iii. 162.

² For detailed discussion see Gard. Chron. n. s. xx (1883) 12, 276, 342.

³ Journ. Bot. xi (1873), 108-115 [translated and revised from Botaniska Notiser, 1872, 168-181].

their origin from species which primitively grew in Japan and adjacent countries." The relations of the European raspberry are undoubtedly with Asiatic and American species, and its closest ally is our common raspberry, *Rubus strigosus*, a species so closely related to *R. idaeus* that the two have sometimes been treated as one. *R. idaeus* is spread over Europe and western Asia and *R. strigosus*, common in North America, grows in Mandschuria and Japan and through Asia to the Altai; so that *R. idaeus* might have been derived from the American *R. strigosus*. Other evidence, however, shows that a large part of the flora of North America originated in eastern Asia,¹ and it is more probable that the European and the American plants had a common ancestor there, the plant with glandless calyx (*R. idaeus*) spreading westward into northern Europe; the other with glandular calyx (*R. strigosus*) crossing Behring Straits to the American continent.

Now the simple form is considered a more primitive stage in leaf-development than is the compound form, so that in *Rubus idaeus*, var. *anomalus*, we have a plant in which the leaves are much simpler in their development than are those of typical *R. idaeus* and the nearly identical *R. strigosus*. After critical study, then, Areschoug, Focke, Babington, and others have concluded that the extremely local round-leaved raspberry of northern Europe is an unusual form of *R. idaeus*, tending, as shown by its short, round leaves, to revert to a simpler ancestral type, and that the plant cannot well be considered a distinct species. This conclusion is well supported by the investigations of Dr. Focke, who says: "I found that the restraining process, by which the form of the foliage leaves was so curiously modified, extended also to the carpellary leaves, and that the axes of these was [were] shortened, so that they did not close and completely envelop the ovules. Of the two ovules in each carpel, one uniformly pined away at a very early stage; the other developed itself during the blooming time in the normal way, but only few carpels were produced. In most cases, however, they dried up whilst the flowering was in progress; and, though some appeared to be fertilized, yet seed entirely failed to ripen. The infertility of the plant I saw, was correlative to the character of its foliage; and we must look upon it as only a curious form of *R. idaeus*, which deviates from the type, so far as the

¹ See Asa Gray, Mem. Am. Acad., n. s. vi.; and extract, "The Flora of Japan," in Scientific Papers of Asa Gray, ii, 125.

form of the leaf is concerned, in the same manner that *Fragaria monophylla* deviates from typical *Fragaria vesca*.”¹

The discovery of this peculiar plant in the Green Mountains is a fact of great significance, and the questions immediately arise, is it truly identical with the European *Rubus idaeus*, var. *anomalus*, or is it a reversion of the similar (if not identical) American *Rubus strigosus*? In one particular alone do the American specimens differ from the European. Among the pubescence on the calyx and peduncles there are some stipitate glands, while the European plant ordinarily has no glands.

Upon this character — the presence or absence of glands — rests the separation of the American *Rubus strigosus* and the European *R. idaeus*. Yet the production of glands, as well as other characters, is very inconstant in the American species. Ordinarily characterized by the glandular calyx, plants are sometimes found with all possible gradations from the glandular to the glandless state. Before me are two numbered specimens of the American plant with absolutely no glands upon the calices — a sheet from Assiniboia, collected in the Cypress Hills by John Macoun (no. 4,550), and another from the Black Hills of South Dakota, collected in Elk Cañon by Rydberg (no. 657). These specimens are, very naturally, called *Rubus strigosus*, Michx., but, were they from European collectors, they would pass without question as *R. idaeus*, L. Other American specimens show strong tendencies toward the European *R. idaeus*. For example, Piper's no. 2879, from Moscow Mountains, Idaho, though with numerous prickles on the calyx, is practically glandless. Often, too, shrubs growing in shade show a strong tendency to lose not only the glands of the calyx but the white pubescence ordinarily characteristic of the leaves. Such tendencies are well illustrated by Piper's no. 2,268, from woods at Spokane, Washington, and by Sandberg, MacDougal, and Heller's no. 259, from rich bottoms in Nez Perces County, Idaho. Similar variations are more or less familiar to all who have watched the American plant in the field. Yet there is, without doubt, a very marked tendency toward the production of glands in the American plant, while the European form is commonly glandless. Maximowicz, following the views of some earlier authors, has treated the American and Asiatic plant as a variety of the European (*R. idaeus*, var. *stri-*

¹O. W. Focke, Journ. Bot., x. 27 [translated from the Oesterreichische Botanische Zeitschrift, 1870, 98].

gosus, Maxim.¹), and there is little doubt that the relationship of the plants is thus more truly presented than by the forced separation of them as specific types. The extreme tendency, as seen in the American plant, to variation not only in leaf but in the degree of gland development, is sufficient to suggest that Maximowicz may be too liberal in his treatment of the glandular plant, for, if in the open one can find the glandular form, and near by, in shade, numerous variations to the glandless state, the recognition of the American plant, even as a geographic variety, seems scarcely warranted.

Nevertheless, whether we regard the two plants as representing mere phases of a polymorphous species, *R. idaeus*, or as somewhat characteristic geographic varieties — the glandular extreme encouraged by the dry atmosphere of the American continent, the glandless one by the moister atmosphere of northern Europe — there is little doubt that they are practically one species. And although the round-leaved plant of the Green Mountains bears upon its calyx more glands than are usual in the European plant, there seems little reason to distinguish it as another variety. That the variable American plant with glandular calyx should occasionally produce a sport parallel with the glandless European var. *anomalus* is possible, and such extreme variations may be looked for with some confidence.

But, in the case of the Cavendish station, it seems not improbable that the plant had the same geographic origin as the colonies in northern Europe, for, at the same station, at least one other plant is known which is far removed from the broad range of its species. There, as already mentioned, is found *Arenaria macrophylla*, a species characteristic of the mountains of our Pacific slope, though occurring also at isolated stations on the Great Lakes and in Labrador. The small *Rubus* at Cavendish, then, is associated with a plant, which, with little doubt, was established there during the northward march of the vegetation at the close of the Glacial Period; and it is reasonable to suppose that the *Rubus*, formerly growing in circumpolar regions, was forced south by the southward extension of the ice, most of the plants² following the meridians which pass through northwestern Europe, but a few following down this side of the Atlantic; and now a remnant of

¹ Bull. Acad. Sci. St. Petersburg, xvii. (1871), 161.

² Although this plant ordinarily produces no fertile drupes, according to Babington (Jour. Bot. xvi. 85) occasional good seed are formed — probably enough to have spread the plant to its few scattered stations.

the ancient American colony persists in this sheltered situation in Vermont, as does *Arenaria macrophylla*, and as, in better known stations, do *Diapensia lapponica*, *Cassiope hypnoides*, and scores of other plants of more northern origin.¹

If this be the true explanation of the source of the Cavendish colony of *Rubus idaeus*, var. *anomalus*, the plant must have occurred among the Green Mountains for thousands of years; but that it is extremely local and scarce is obvious from the fact that it has remained unobserved upon this continent until the present year. This extreme scarcity of the plant, in a region where the climatic conditions seem favorable, is probably due to the usual sterility of the drupes as emphasized by the European authors who have studied the plant, and as likewise observed by Mr. Eggleston at the Vermont station.

If, on the other hand, the Cavendish plant is considered a reversion of the glandular *Rubus strigosus*, we are adding nothing to the argument that the American and European species are distinct, for, if the two plants produce occasional sports so similar as to be undistinguishable, we have fair evidence of their common ancestry if not identity. In view of the extreme inconstancy of the glandular character of the two plants — the chief character relied upon to separate them — it seems best to consider our American *R. strigosus* specifically identical with the European *R. idaeus*, and to treat the small round-leaved variety from the Green Mountains as *R. idaeus*, var. *anomalus*.

GRAY HERBARIUM.

Explanation of Plate 20. *Rubus idaeus*, L., var. *anomalus*, Arrhenius, drawn from a Vermont specimen by C. E. Faxon.

COMMELINA VIRGINICA ESTABLISHED IN NEW ENGLAND. — *Commelina Virginica*, recorded in the Manual as occurring from New York southward, has now for some years maintained itself perfectly in several parts of Providence, coming up each year and blooming profusely. It escapes from hot houses and winter gardens. — W. W. BAILEY, Brown University.

[In some places about Boston and Cambridge, this *Commelina* has persisted for years in damp yards and in waste ground. — ED.]

¹ See RHODORA, ii, 138-139.